

# NASA TECH BRIEF

## *Lyndon B. Johnson Space Center*



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### Preparation of Prepreg Graphite Tape with Insoluble Polymer

Composite materials are a combination of a polyimide prepreg with incorporated fibers of a reinforcing material such as graphite. The graphite fibers are usually prepared on a tape which is then wound or laid onto the prepreg.

A new method of preparing graphite tape greatly facilitates the preparation of temperature-resistant fibrous composites with a polymer matrix.

A powdered polymer is finely ground in a ball mill. A second, but soluble, polymer that is to serve as a carrier-binder is mixed with an appropriate solvent. The milled polymer and graphite (or other types) filaments are added to the soluble polymer-solvent solution to create a slurry.

The slurry is dried, and the soluble polymer acts as a binder to hold the insoluble polymer to the graphite fibers. When ready for processing, the soluble, binder-polymer is removed by heat during the precure or cure cycle.

In an experimental preparation, Ryton-B (registered trademark-Phillips Petroleum Co., Bartlesville, Oklahoma) was used as the insoluble polymer and polyvinyl alcohol

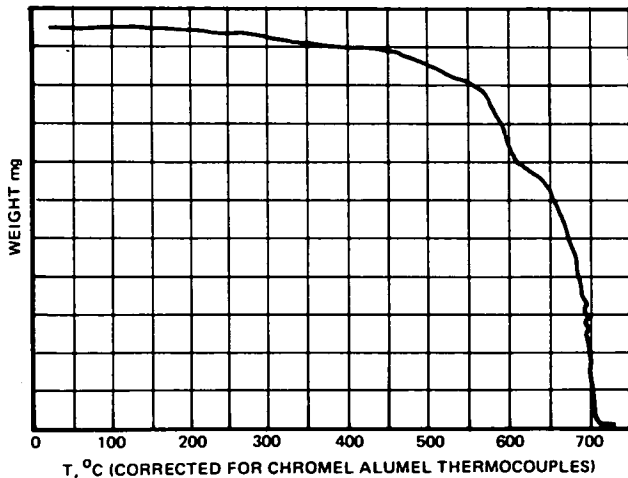


Figure 1. TGA Curve in Air

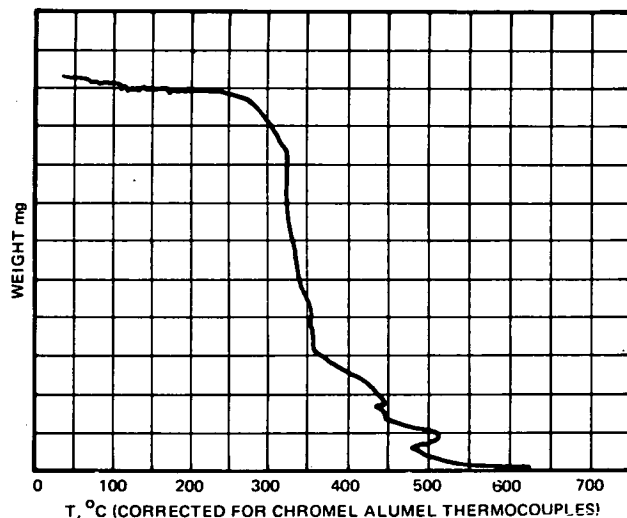


Figure 2. PVA-TGA Curve in Air

as the carrier-binder. The Ryton-B and graphite were added to polyvinyl alcohol (soluble polymer) and water (the solvent). The alcohol-to-water ratio was adjusted to control the drying rate, and the addition of 10% solid polyvinyl alcohol (PVA) to the solution increased the viscosity and held the finely milled Ryton-B in suspension. After drying, the polyvinyl alcohol was removed by heating. The thermogravimetric analysis curves in Figures 1 and 2 show that the PVA can be burned off well before the melting point of Ryton-B.

#### Note:

The following documentation may be obtained from:  
National Technical Information Service  
Springfield, Virginia 22151  
Single document price \$7.00  
(or microfiche \$0.95)

Reference: NASA CR-115713 (N72-28880)  
Heat Resistant Composite Structure Applications

(continued overleaf)

**Patent status:**

NASA has decided not to apply for a patent.

Source: C. I. Yates of  
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